mitex SI LED 1 x 8

Alphanumeric LED Display with Serial Interface

User's Manual

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Table of Contents

1 GENERAL 4

2 APPLICATIONS EXAMPLES 5

3 TECHNICAL DATA 6

3.1 Normal Operation 6

3.2 Start-Up Performance 7

3.3 Hardware and Software Self-Tests 8

3.4 Interfaces 9

3.5 Data Format 9

3.6 Frame Formats 9

3.7 Query Frame 10

3.8 Data Unit 11

3.9 Response Frame 13

4 CONNECTOR PIN ASSIGNMENTS 15

4.1 Display Elements 18

5 HOUSING DIMENSIONS 19

5.1 Installation / Mounting 20

6 APPENDIX 21

6.1 Standard Equipment 21

6.2 Optional Accessories 21

6.3 Order Numbers 21

6.4 Maintenance and Care 22

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6.5	**Declaration of Conformity**	**23**
6.6	**ASCII Character Set**	**24**
6.7	**Warranty / Liability**	**26**
6.8	**Versions Overview**	**27**

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Alphanumeric LED Display with Serial Interface

1 General

This bus compatible LED monitor has been designed for industrial applications.

The display unit consists of an 8-digit dot matrix display with a character height of 30 mm. Each character is displayed with a resolution of 5 x 7 pixels.

Two serial interfaces are available for driving the display (RS 232 and RS 485).

Interface:
- Protocol is in compliance with Profibus
- Physical RS 232 / RS 485 interface

Display:
- Dot matrix with 5 x 7 pixels per digit
- 30 mm characters, 8 digits
- 4 brightness levels

Power Supply:
- 24 VDC, approx. 250 mA at full brightness
- Overvoltage protection, protected against pole reversal

Housing:
- DIN panel-mount housing, metal with special surface finish.

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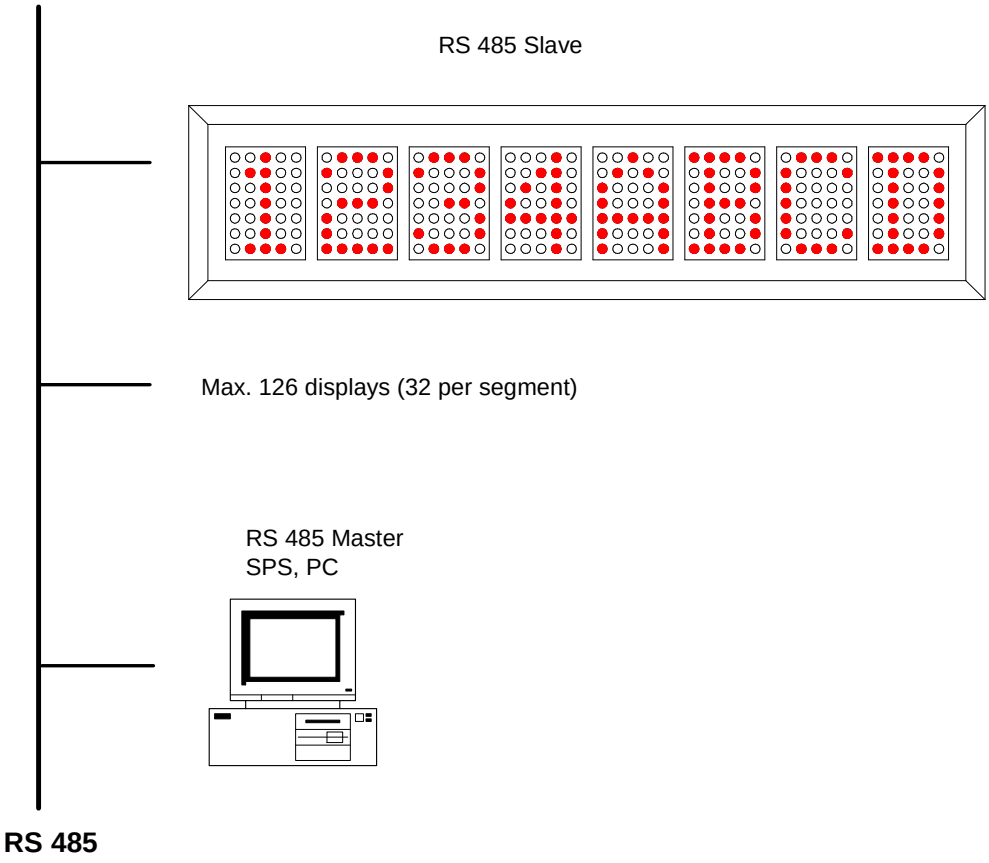
2 Applications Examples



Note: RS 232 is not bus compatible. Only point-to-point connections can be established.

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3 Technical Data

General Specifications

Display type:	LED dot matrix
Character height:	30 mm
Digits:	8
Resolution:	5 x 7 pixels per character
Display colour:	red, green
Operating voltage:	24 VDC +/- 20 %
Power consumption:	40 mA at idle 250 mA at full brightness
Interface:	serial, bus compatible RS 485, RS 232
Protocol:	ASCII
Baud rate:	2400, 4800, 9600, 19200 baud
Addresses:	0 to 127
Parities:	even, odd, none
Housing:	DIN panel-mount housing, metal with special surface finish
Housing dimensions:	see chapter 5
Mounting:	screw clamps
Protection:	front panel: IP54 or IP65
Operating temp.:	0 to + 45 °C
Storage temperature:	- 10 to + 60 °C
Humidity:	45 to 85 %

3.1 Normal Operation

Display data received via the communications interface appear at the dot matrix display. A character set of all displayable characters can be found in the appendix.

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3.2 Start-Up Performance

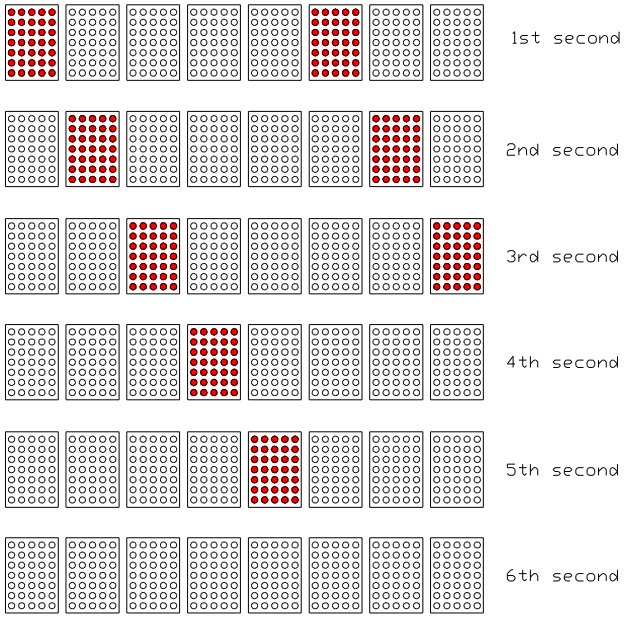
The following steps are performed after supply power has been connected to the display:

- Hardware test and setpoint value initialisation: This step takes about 0.6 seconds.

Serial communication is inactive during this time.

- Display test: This step takes about 6 seconds, and all pixels from either 1 or two digits are displayed per second at maximum brightness (100 %).

  Serial communications are active during this time.



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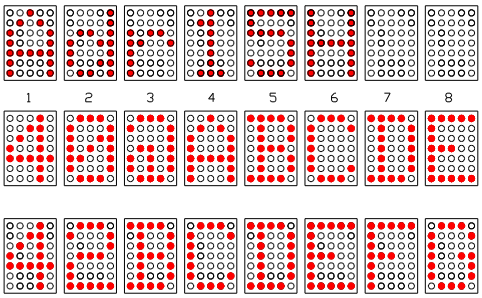
3.3 Hardware and Software Self-Tests

After the display has been connected to power, and if the test mode DIP switch has been activated, the following steps are performed:

The hardware is tested and the register is initialised. The address is displayed for the first second. The entire character set from ASCII code 00H through 7FH is then displayed.

The ASCII code is displayed at digits 1 and 2, and the corresponding character appears at the following digit. After 1 second, the ASCII code is increased by 2.



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3.4 Interfaces

A transmission speed can be selected with the DIP switches.

One of the following baud rates can be selected:

- 2 400 baud
- 4 800 baud
- 9 600 baud
- 19 200 baud.

3.5 Data Format

The data format can be selected with the DIP switches. The following formats are possible:

- 1 start bit, 8 data bits, 1 parity bit (even), 1 stop bit
- 1 start bit, 8 data bits, 1 parity bit (odd), 1 stop bit
- 1 start bit, 8 data bits, 1 stop bit
- 1 start bit, 8 data bits, 2 stop bits.

3.6 Frame Formats

The frame formats are in compliance with the Profibus standard with the following limitations:

- Synchronisation time SYN (33 bits) is not tested in its full length.
- Only frames included in the **S**ende**D**ienst **2** group (SD2, variable length) are recognised.
- Only SDN and SRD services are used.
- **S**ervice **A**ccess **P**oints are not used for addressing.

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3.7 Query Frame

Frame Header 7 bytes							DATA_UNIT 12 bytes	Frame Trail 2 bytes	
SD2	**LE**	**LEr**	**SD2**	**DA**	**SA**	**FC**	**DATA_UNIT**	**FCS**	**ED**
				Σ = FCS					

Frame Header

SD2	Start byte 2 (start delimiter), code = 68H
LE	Length byte, value = 0FH (DA, SA, FC, DATA_UNIT ⇒ corresponds to 15 bytes =0FH)
LEr	Repeat length byte
SD2	Start byte 2 (start delimiter), code = 68H
DA	Destination address byte ⇒ address display
SA	Source address byte ⇒ address computer = 00H
FC	Frame control byte = 7CH

Data Unit

DATA_UNIT	Data Field

Frame Trail

FCS	Frame check sequence = low byte from addition of DA, SA, FC, DATA_UNIT
ED	End byte (end delimiter), code 16H

Broadcast address “7FH” enables the simultaneous clearing of all displays.

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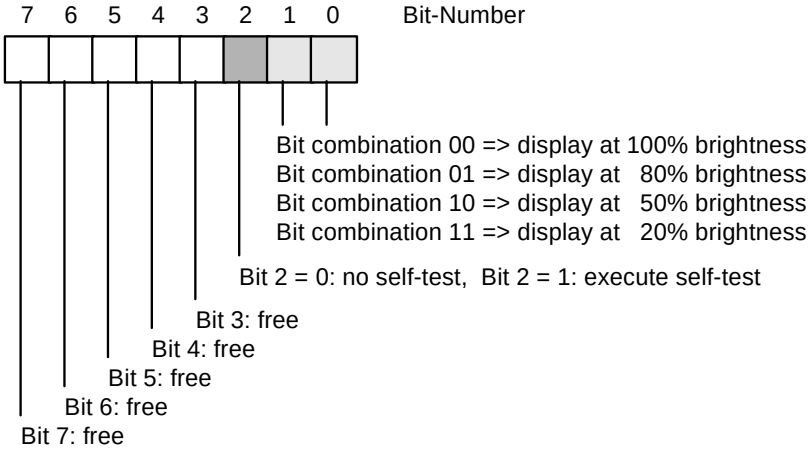
3.8 Data Unit

Ctrl1	Ctrl2	Strb1	Strb2	D1	D2	D3	D4	D5	D6	D7	D8

Ctrl1: control byte 1: reserved, must be set to 00 H
Ctrl2: control byte 2: reserved, must be set to 00 H

Strb1: Control Byte 1: Brightness Setting (4 levels), Self-Test


7 6 5 4 3 2 1 0
Bit-Number
Bit combination 00 => display at 100% brightness
Bit combination 01 => display at 80% brightness
Bit combination 10 => display at 50% brightness
Bit combination 11 => display at 20% brightness
Bit 2 = 0: no self-test, Bit 2 = 1: execute self-test
Bit 3: free
Bit 4: free
Bit 5: free
Bit 6: free
Bit 7: free

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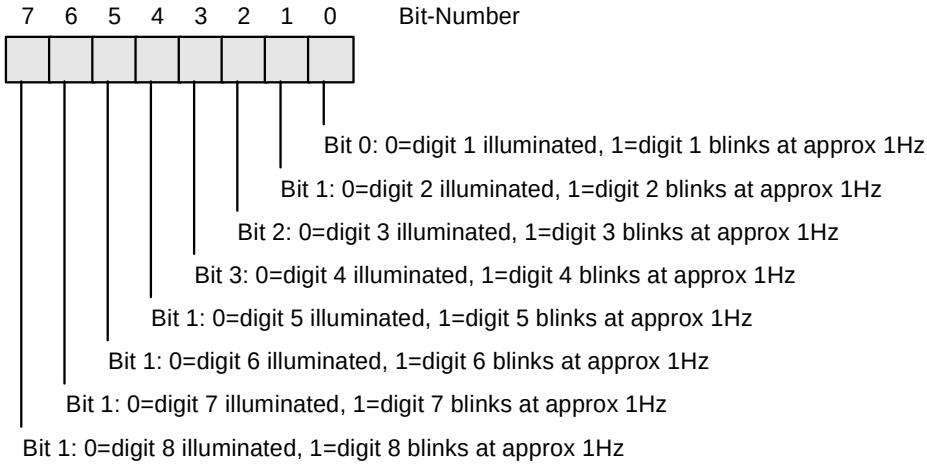
Strb2: Control Byte 2: Blinking


7 6 5 4 3 2 1 0
Bit-Number
Bit 0: 0=digit 1 illuminated, 1=digit 1 blinks at approx 1Hz
Bit 1: 0=digit 2 illuminated, 1=digit 2 blinks at approx 1Hz
Bit 2: 0=digit 3 illuminated, 1=digit 3 blinks at approx 1Hz
Bit 3: 0=digit 4 illuminated, 1=digit 4 blinks at approx 1Hz
Bit 1: 0=digit 5 illuminated, 1=digit 5 blinks at approx 1Hz
Bit 1: 0=digit 6 illuminated, 1=digit 6 blinks at approx 1Hz
Bit 1: 0=digit 7 illuminated, 1=digit 7 blinks at approx 1Hz
Bit 1: 0=digit 8 illuminated, 1=digit 8 blinks at approx 1Hz

The blink function is active as long as the bit is set.

- D1: display data in ASCII code for digit 1
- D2: display data in ASCII code for digit 2
- D3: display data in ASCII code for digit 3
- D4: display data in ASCII code for digit 4
- D5: display data in ASCII code for digit 5
- D6: display data in ASCII code for digit 6
- D7: display data in ASCII code for digit 7
- D8: display data in ASCII code for digit 8.

In order to clear all of the digits at the display, the 8 display data in the data frame (D1 through D8) must contain the blank character “20H”. Digit 1 is all the way to the left.

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3.9 Response Frame

The response frame has the following format:

Frame Header 7 Byte							DATA_UNIT 2 Byte		Frame Trail 2 Byte	
SD2	LE	LEr	SD2r	DA	SA	FC			CHK	ED

Frame Header

SD2	Start byte 2 (start delimiter), code = 68H
LE	Length byte, value = 05H (DA, SA, FC, DATA_UNIT ⇒ corresponds to 5 bytes = 05H)
LEr	Repeat length byte
SD2	Start byte 2 (start delimiter), code = 68H
DA	Destination address byte ⇒ address computer = 00H
SA	Source address byte ⇒ address display
FC	Frame control byte = 08H

Data Unit

DATA_UNIT	Data field ⇒ status byte 1, status byte 2

Frame Trail

FCS	Frame check sequence = low byte from addition of DA, SA, FC, DATA_UNIT
ED	End byte (end delimiter), code 16H.

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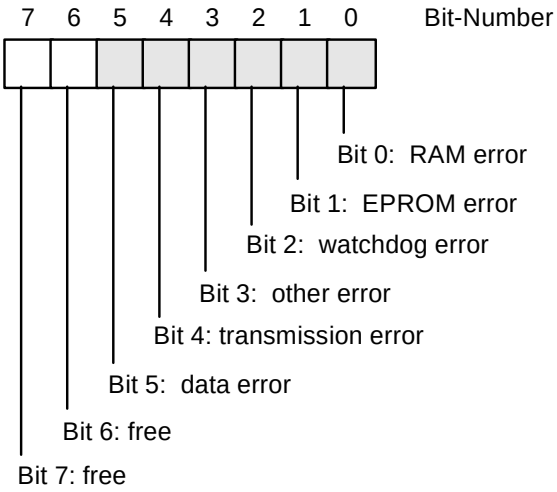
Status Byte 1:



Status Byte 2: is reserved. Its content corresponds to the content of status byte 1.

Example:

Query frame from the master, address 07H:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
68	0F	0F	68	07	00	7C	00	00	00	00	31	32	33	34	35	36	37	38	27	16

Response frame for faultless transmission:

1	2	3	4	5	6	7	8	9	10	11
68	05	05	68	00	07	08	00	00	0F	16

1, 2, 3, 4, 5, 6, 7 and 8 are displayed at full brightness without blinking.

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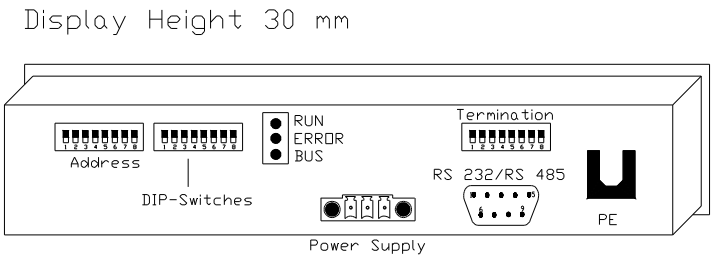
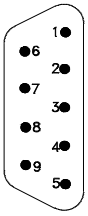
4 Connector Pin Assignments



9-Pin Sub-Miniature Plug Connector



Pin	RS 232	RS 485
1	n.c.	n.c.
2	RxD	n.c.
3	TxD	Rx+ / Tx+
4	n.c.	n.c.
5	GND ext	GND ext
6	n.c.	+5V ext
7	n.c.	n.c.
8	n.c.	Rx- / Tx-
9	n.c.	n.c.

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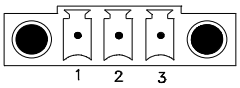
Alphanumeric LED Display with Serial Interface

3-Pole Terminal Block

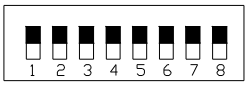


Pin	Power Supply
1	+ 24 VDC
2	GND
3	PE

Triple LED Monitor

LED Monitor		
1	Run LED	Normal operation: blinks at approx. 1 Hz
2	Error LED	Normal operation: active when bus error occurs
3	Bus LED	Normal operation: active during bus transmission

8-Fold DIP Switch Array (Address)



Address		ON	OFF
DIP 1	Address: 2^0	1_D	0
DIP 2	Address: 2^1	2_D	0
DIP 3	Address: 2^2	4_D	0
DIP 4	Address: 2^3	8_D	0
DIP 5	Address: 2^4	16_D	0
DIP 6	Address : 2^5	32_D	0
DIP 7	Address : 2^6	64_D	0
DIP 8	n.c.	-	-

The highest possible address is 126_D

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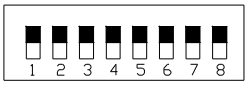
8-Fold DIP Switch Array

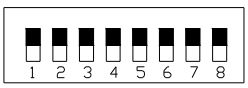


DIP 1	DIP 2	DIP 3	Function
1	0	0	2400 Baud
0	1	0	4800 Baud
1	1	0	9600 Baud
0	0	1	19200 Baud

If DIP switches 1 through 3 are configured to any other setting, a baud rate of 9600 is used.

DIP	ON	OFF	Comment
4	Use parity bit	Don't use parity bit	
5	Even parity	Odd parity	DIP 5 is only taken into considera-tion if DIP 4 is set to ON.
6	2 stop bits	1 stop bit	
7	n.c.	n.c.	
8	Test mode	Normal operation	

8-Fold DIP Switch Array (Termination)



Termination	1	2	3	4	5	6	7	8
RS 485 without bus terminator	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
RS 485 with bus terminator	ON	ON	ON	ON	ON	OFF	OFF	OFF
RS 232	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

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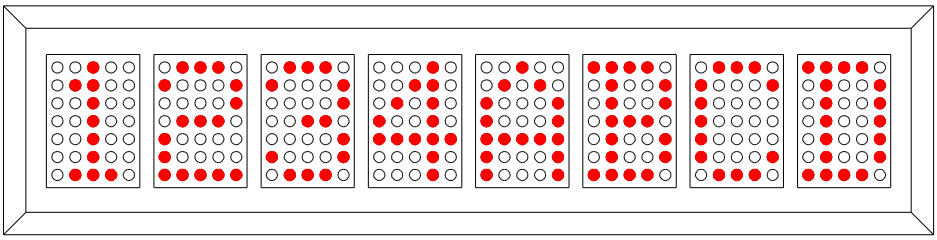
4.1 Display Elements



Components	Function / Description
Display:	5 x 7 dot matrix display
Character Height:	30 mm
Number of Characters:	1
Digits:	8
Display Colour:	red, green, 4 brightness levels
Display:	ASCII character set

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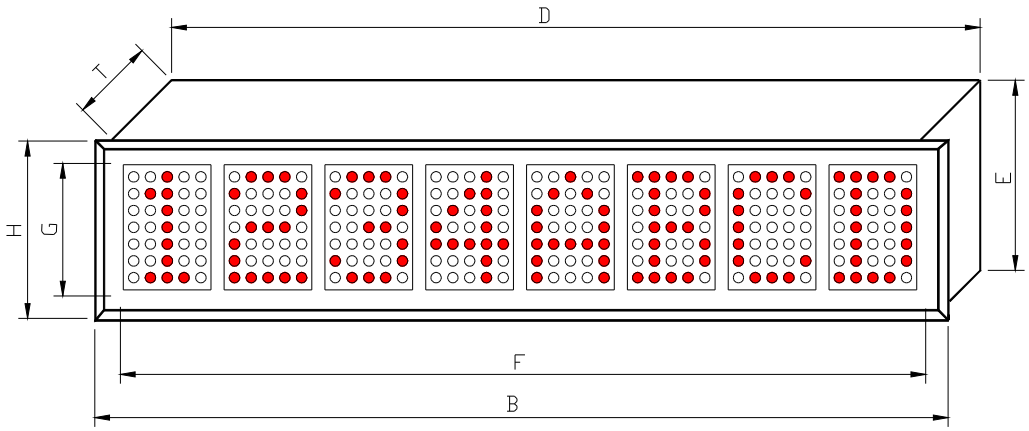
5 Housing Dimensions



Char. Height G	F	B	H	D	E	T
30	225	264	48	254	40	40

All dimensions in mm

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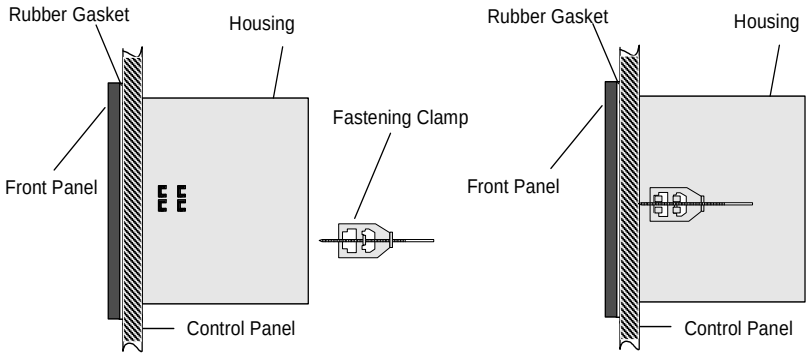
5.1 Installation / Mounting

The display has been designed for mounting to a panel. The tabs provided to this end are bent up to enable fastening of the clamps after the device has been inserted.

A rubber gasket seals the device's front panel against the control panel (IP65).



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6 Appendix

6.1 Standard Equipment

- Display with current software and hardware versions
- Mounting materials (screw clamps M4)
- Mating plug for power supply
- User's manual.

6.2 Optional Accessories

- User's manual, A4 format (German or English)
- Mounting materials (screw clamps M2,5)
- Replacement plug for power supply.

6.3 Order Numbers

Designation	Order Number
User’s manual, German	X-M21-2LE15X-001
User’s manual English	X-M22-2LE15X-001
Mounting materials screw clamps M2,5	G-S-023
3-pole socket connector	M-B-B-E-3-003

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6.4 Maintenance and Care

Observe the following instructions in order to assure best possible performance of the display:

- Never cover ventilation slots (if included) or the air inlet, because this blocks the flow of air. When installing the device, be sure to allow for adequate clearance at the back, front and top to assure sufficient ventilation.
- If included, clean the ventilation slots at the back, front and top from time to time.
- The display must be switched off before cleaning.
- Protect the display from excessive humidity, extreme vibration, direct sunlight and extreme temperatures. Non-observance may lead to malfunctioning or destruction of the device. Under certain circumstances electrical shock, fire and explosion may occur as well. Information concerning allowable ambient conditions, including recommended temperature and atmospheric humidity ranges, can be found in the chapter entitled “Technical Data”
- The display may not be placed into service if the device and/or the power cable are known to be damaged.
- Do not attempt to open or repair the device yourself. The guarantee is rendered null and void if the device is tampered with by unauthorised persons.

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6.5 Declaration of Conformity

EG-Konformitätserklärung
Declaration of EC-Conformity

Produktbezeichnung: **mitex SI LED 1 x 8**
Product name:

Produktbeschreibung: Alphanumerisches LED-Display mit seriellem Interface /
Product description: Alphanumeric LED Display with Serial Interface

Hersteller: microSYST Systemelectronic GmbH
Manufacturer: Albert-Einstein-Straße 7
92637 Weiden

Das bezeichnete Produkt stimmt mit der folgenden Europäischen Richtlinie überein: We herewith confirm that the above mentioned product meets the requirements of the following standard:		**Die Übereinstimmung des bezeichneten Produktes mit den Vorschriften der Richtlinie wird nachgewiesen durch die vollständige Einhaltung folgender Normen:** The correspondence of the above mentioned product with these requirements is proved by the fact that these products meet with the following single standards:
Nummer	**Bezeichnung**	**Europäische Norm**
2004/108/EG	**Elektromagnetische Verträglichkeit (EMV)**	EN61000-6-2:2006
		EN61000-6-4:2007

Weiden, den 04.04.2013

Harald Kilian

Leiter operatives Geschäft / COO
Prokurist / Authorized Signatory

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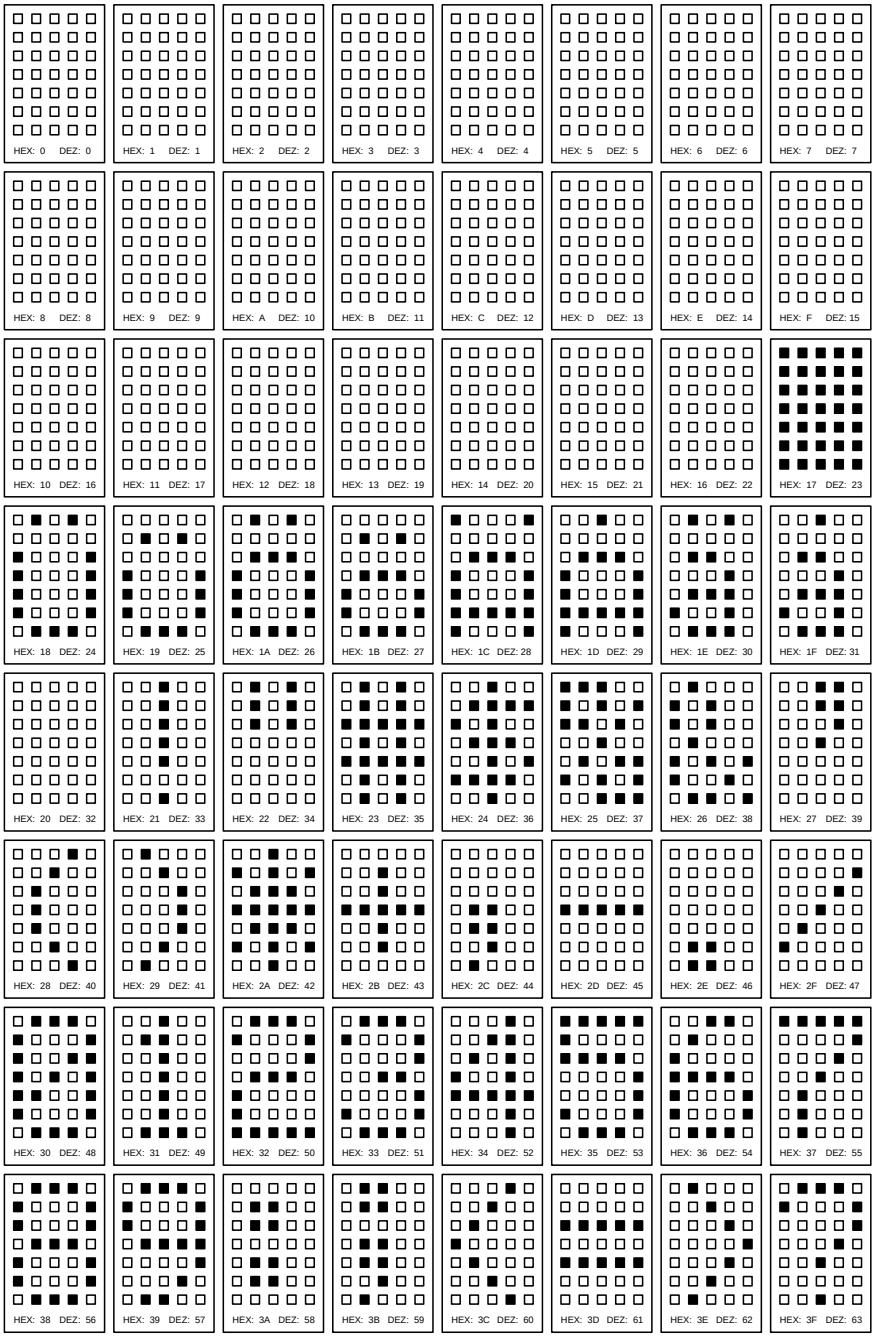
6.6 ASCII Character Set


HEX: 0 DEZ: 0
HEX: 1 DEZ: 1
HEX: 2 DEZ: 2
HEX: 3 DEZ: 3
HEX: 4 DEZ: 4
HEX: 5 DEZ: 5
HEX: 6 DEZ: 6
HEX: 7 DEZ: 7
HEX: 8 DEZ: 8
HEX: 9 DEZ: 9
HEX: A DEZ: 10
HEX: B DEZ: 11
HEX: C DEZ: 12
HEX: D DEZ: 13
HEX: E DEZ: 14
HEX: F DEZ: 15
HEX: 10 DEZ: 16
HEX: 11 DEZ: 17
HEX: 12 DEZ: 18
HEX: 13 DEZ: 19
HEX: 14 DEZ: 20
HEX: 15 DEZ: 21
HEX: 16 DEZ: 22
HEX: 17 DEZ: 23
HEX: 18 DEZ: 24
HEX: 19 DEZ: 25
HEX: 1A DEZ: 26
HEX: 1B DEZ: 27
HEX: 1C DEZ: 28
HEX: 1D DEZ: 29
HEX: 1E DEZ: 30
HEX: 1F DEZ: 31
HEX: 20 DEZ: 32
HEX: 21 DEZ: 33
HEX: 22 DEZ: 34
HEX: 23 DEZ: 35
HEX: 24 DEZ: 36
HEX: 25 DEZ: 37
HEX: 26 DEZ: 38
HEX: 27 DEZ: 39
HEX: 28 DEZ: 40
HEX: 29 DEZ: 41
HEX: 2A DEZ: 42
HEX: 2B DEZ: 43
HEX: 2C DEZ: 44
HEX: 2D DEZ: 45
HEX: 2E DEZ: 46
HEX: 2F DEZ: 47
HEX: 30 DEZ: 48
HEX: 31 DEZ: 49
HEX: 32 DEZ: 50
HEX: 33 DEZ: 51
HEX: 34 DEZ: 52
HEX: 35 DEZ: 53
HEX: 36 DEZ: 54
HEX: 37 DEZ: 55
HEX: 38 DEZ: 56
HEX: 39 DEZ: 57
HEX: 3A DEZ: 58
HEX: 3B DEZ: 59
HEX: 3C DEZ: 60
HEX: 3D DEZ: 61
HEX: 3E DEZ: 62
HEX: 3F DEZ: 63

Continued on next page

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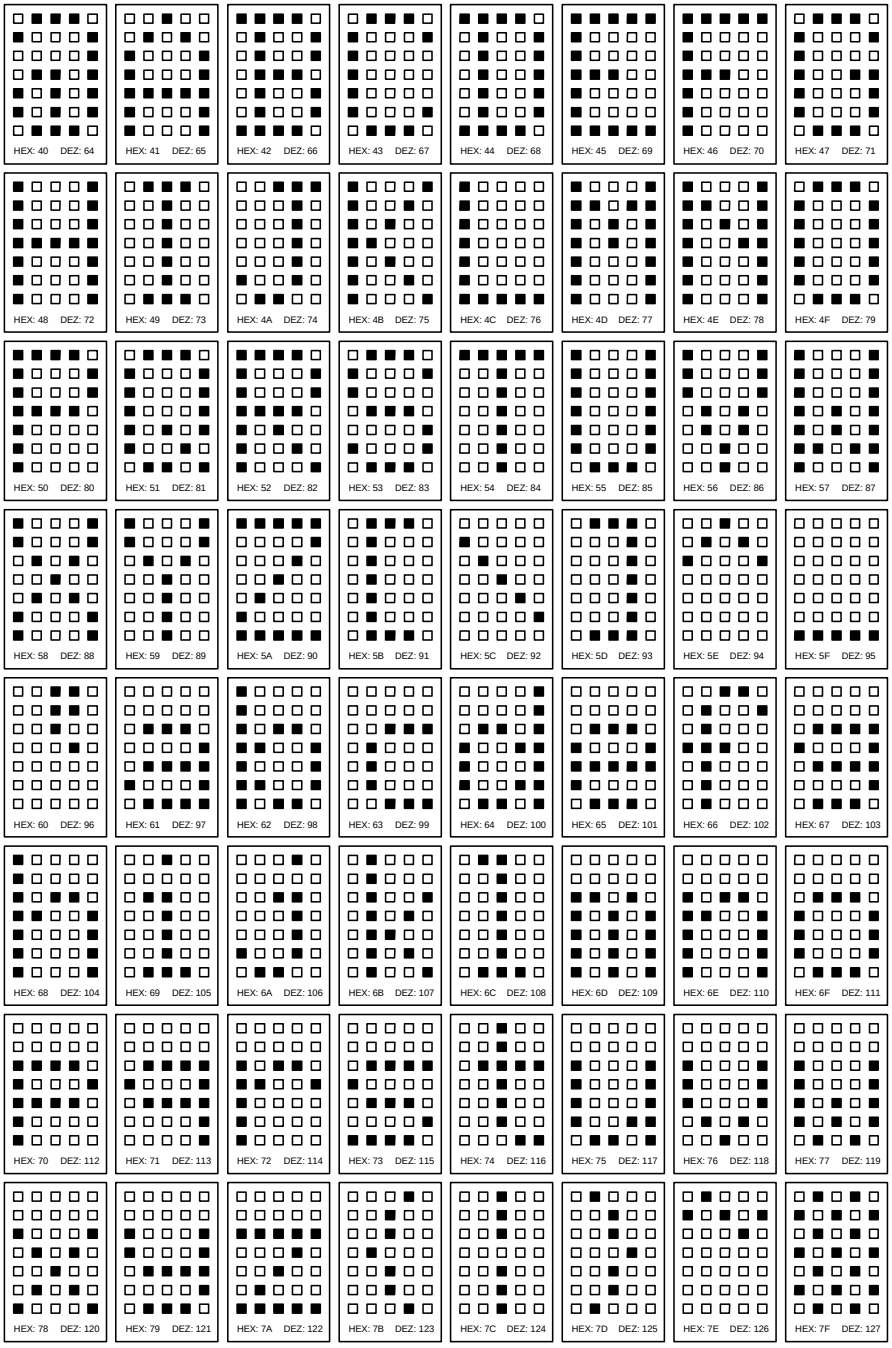
mitex SI LED 1 x 8

Alphanumeric LED Display with Serial Interface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HEX: 41 DEZ: 65
HEX: 42 DEZ: 66
HEX: 43 DEZ: 67
HEX: 44 DEZ: 68
HEX: 45 DEZ: 69
HEX: 46 DEZ: 70
HEX: 47 DEZ: 71
HEX: 48 DEZ: 72
HEX: 49 DEZ: 73
HEX: 4A DEZ: 74
HEX: 4B DEZ: 75
HEX: 4C DEZ: 76
HEX: 4D DEZ: 77
HEX: 4E DEZ: 78
HEX: 4F DEZ: 79
HEX: 50 DEZ: 80
HEX: 51 DEZ: 81
HEX: 52 DEZ: 82
HEX: 53 DEZ: 83
HEX: 54 DEZ: 84
HEX: 55 DEZ: 85
HEX: 56 DEZ: 86
HEX: 57 DEZ: 87
HEX: 58 DEZ: 88
HEX: 59 DEZ: 89
HEX: 5A DEZ: 90
HEX: 5B DEZ: 91
HEX: 5C DEZ: 92
HEX: 5D DEZ: 93
HEX: 5E DEZ: 94
HEX: 5F DEZ: 95
HEX: 60 DEZ: 96
HEX: 61 DEZ: 97
HEX: 62 DEZ: 98
HEX: 63 DEZ: 99
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HEX: 65 DEZ: 101
HEX: 66 DEZ: 102
HEX: 67 DEZ: 103
HEX: 68 DEZ: 104
HEX: 69 DEZ: 105
HEX: 6A DEZ: 106
HEX: 6B DEZ: 107
HEX: 6C DEZ: 108
HEX: 6D DEZ: 109
HEX: 6E DEZ: 110
HEX: 6F DEZ: 111
HEX: 70 DEZ: 112
HEX: 71 DEZ: 113
HEX: 72 DEZ: 114
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HEX: 74 DEZ: 116
HEX: 75 DEZ: 117
HEX: 76 DEZ: 118
HEX: 77 DEZ: 119
HEX: 78 DEZ: 120
HEX: 79 DEZ: 121
HEX: 7A DEZ: 122
HEX: 7B DEZ: 123
HEX: 7C DEZ: 124
HEX: 7D DEZ: 125
HEX: 7E DEZ: 126
HEX: 7F DEZ: 127

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6.7 Warranty / Liability

For the product, liability is assumed for defects, which existed at the delivery date according to our General Terms and Conditions.

Technically changes as well as errors are excepted. A claim for delivery of a new product does not exist. The buyer has to check the received product immediately and indicate evident defects at the latest 24 hours after detection. Non-observance of notification requirements is equated with acceptance of the defect. Not immediately visible defects have to be indicated immediately after their perception too.

Generally, defects and their symptoms must be described as accurately as possible in order to allow for reproducibility and elimination. The buyer must provide for access to the relevant device and all required and/or useful information at no charge and must make all of the required data and machine time available free of charge.

The guarantee does not cover defects, which result from non-observance of the prescribed conditions of use, or from improper handling.

If the device has been placed at the disposal of the buyer for test purposes and has been purchased subsequent to such testing, both parties agree that the product is to be considered “used” and that it has been purchased “as is”. No guarantee claims may be made in such cases.

The General Terms and Conditions of microSYST Systemelectronic GmbH in current version apply as well.

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6.8 Versions Overview

Ver.	Date	Comments, Description
1.00	6/16/99	
1.10	12/13/01	Kreuzer: Layout
1.20	12/16/02	Kreuzer: New logo
1.30	7/17/04	Kreuzer: New designation Rx/Tx +/-
1.40	2/7/12	Device type 17 mm removed
1.50	4/4/13	Company address, declaration of conformity, warranty
1.60	10/23/13	Logo

Certified per **DIN EN ISO 9001**.

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